Influences on the psychosocial adjustment of siblings of children with autism spectrum disorder in Taiwan and the United Kingdom

1. Introduction

Autism spectrum disorder (ASD) is a life-long disability, entailing a complex and variable profile of behaviours which can impact negatively on family well-being and stress levels (Mcstay, Trembath, & Dissanayake, 2014; Myers, Mackintosh, & Goin-Kochel, 2009). Children with ASD have different levels of impairment in social interaction and communication, and may also exhibit disruptive behavior and emotional disturbance, posing different, long-term challenges for each member of the family (Meadan, Stoner, & Angell, 2010; Rodrigue, Geffken, & Morgan, 1993).

Sibling relations are important for child development generally (Dunn, 1983; Lamb, 2014). Previous work has shown that siblings of disabled children are more susceptible to psychological maladjustment than those of healthy or typically developing (TD) children (Petalas et al., 2012; Ross & Cuskelly, 2006). Meadan, Stoner, and Angell (2010) reviewed 12 articles published between 1997 and 2008, and concluded that the negative consequences of having a sibling with ASD included: lower levels of prosocial behaviour, behaviour problems (both internal and external behaviour) and poorer socialisation skills. However, they also reported positive consequences including positive self-concept and good social competence. Despite the limitations children with ASD experience in social interaction, some siblings of children with ASD report that they appreciate their ASD siblings' unique achievements and have learnt from their siblings (Mascha & Boucher, 2006). They also report less conflict and competitiveness than between typically developing siblings (Kaminsky & Dewey, 2002; Rivers & Stoneman, 2003). It is clear that it is important to explore positive, as well as negative, outcomes in sibling research. This might point the way to how families can nurture positive outcomes for siblings.

Studies to date have reported mixed findings, perhaps because many have not included adequate research samples to control for the multivariate influences on outcome (Hodapp, Glidden, & Kaiser, 2005; Stoneman, 2005). Moreover, research has often relied on parent reports to evaluate TD sibling adjustment. It is not always clear how TD siblings view themselves and whether this is consistent with the observations of an adult informant. Including TD sibling self-report measures may

help to elucidate patterns in the existing literature and provide more practical information for intervention (Hastings & Petalas, 2014; Macks & Reeve, 2007).

The Double ABCX Model (Mccubbin & Sussman, 1983) has been used previously as a theoretical framework for detecting the degree of family stress and how parents cope in both ASD family research (Mcstay, et al., 2014; Pakenham, et al., 2005; Pozo, Sarriá, & Brioso, 2014) and in cross cultural family disability research (Shin & Crittenden, 2003). With the guidance of such models, factors previously shown to be associated with TD siblings' adjustment include demographic variables (Giallo & Gavidia Payne, 2006; Kaminsky & Dewey, 2002; Macks & Reeve, 2007), and psychological variables, including the severity of the child's autistic symptoms (Benson, 2006; Gadow, Devincent, Pomeroy, & Azizian, 2004; Hastings, 2003a), TD siblings' life experience (Orsmond & Seltzer, 2009), social support (Conway & Meyer, 2008; Tsao, Davenport, & Schmiege, 2012), coping strategies (Orsmond & Seltzer, 2009; Roeyers & Mycke, 1995; Ross & Cuskelly, 2006) and the Broader Autism Phenotype (BAP) trait level (Bauminger & Yirmiya, 2001; Hastings, 2003b; Petalas, et al., 2012; Petalas, Hastings, Nash, Lloyd, & Dowey, 2009).

The BAP is a sub-clinical set of social, cognitive, and behavioural personality traits sometimes found in the immediate family (parents and siblings) of children with ASD (Bailey, Palferman, Heavey, & Le Couteur, 1998; Bolton et al., 1994; Piven, Palmer, Jacobi, Childress, & Arndt, 1997). These related traits may make TD siblings or parents more vulnerable to feelings of anger, frustration and rejection (Constantino et al., 2006; Yoder, Stone, Walden, & Malesa, 2009). For example, Orsmond and Seltzer (2009) found that TD siblings who had a higher level of BAP traits and experienced a greater number of stressful life events, reported elevated depressive and anxiety symptoms.

Though some demographic variables are relatively fixed (e.g. family size and gender) and other variables are hard to change (e.g. BAP levels and severity of symptoms), knowing whether and how they affect sibling adjustment can help to identify particular families who may require additional support. Furthermore, it might be possible to improve adjustment outcomes by increasing family support or the development of appropriate coping strategies. In particular, the coping style of both

parents and siblings may be crucial. Parental coping has been found to have an influence on children's coping, through modelling, coaching and adjusting to their children's characteristics (Power, 2004; Skinner & Zimmer-Gembeck, 2007). If those working within health and education can develop a better understanding of how factors such as social support, coping and BAP level influence outcome, and provide TD siblings with well-tailored support to adapt to family life, the function of the family might be improved and the risk of psychosocial problems for the TD sibling reduced.

However, a crucial factor which may influence patterns of sibling adjustment is the cultural environment (Berry, Poortinga, Breugelmans, Chasiotis, & Sam, 2011). In the case of families with a child with disabilities, cultural factors can affect the ways that families seek help, approach treatments and resources, and can influence parental coping patterns and child-rearing (Holroyd, 2003; Ravindran & Myers, 2011). To date, the majority of research studies with families with a child with ASD have taken place in Western populations (Hastings & Petalas, 2014; Hesse, Danko, & Budd, 2013; Orsmond, Kuo, & Seltzer, 2009). There is some cross-cultural research on families with a disabled child, but this largely focuses on parenting strategies (Blacher & Mcintyre, 2006; Cho, Singer, & Brenner, 2000; McConkey, Truesdale-Kennedy, Chang, Jarrah, & Shukri, 2008) or maternal coping and adjustment (Lin, Orsmond, Coster, & Cohn, 2011). Work has shown that in collectivistic cultures, parents of children with disabilities use multiple different coping strategies simultaneously to deal with stress (Mak & Ho, 2007). Gau and colleagues (2010), focused specifically on siblings, examining the influence of children with ASD's behavioural problems and of parenting styles on TD siblings in Taiwan. Their findings indicated that, as shown in some Western research, siblings of children with ASD were more likely to have emotional/behavioural problems compared to siblings of typically developing children. However, as a Western comparison group was not included in this study, it is not yet fully clear how culture shapes sibling adjustment, and how demographic and psychological factors influence outcomes in different cultural contexts.

Despite these few examples, little progress has therefore been made in research on the cultural factors that shape the experiences of the siblings of children with ASD. This work is important to inform theory in this field (McHale, Updegraff, & Feinberg,

2016) but also to ensure that recommendations for health and education are culturally appropriate. In this paper we report on a study designed to provide information about these issues, guided by the Double ABCX model and taking into account factors such as family demographics, experience of stressful life events, and severity of autism symptoms in the affected sibling, in order to explore the impact of social support, coping strategy and BAP levels on adjustment in two different cultural contexts. To this end we specifically address three research questions of interest:

1. What is the self-reported adjustment status of TD siblings of children with ASD in Taiwan and the UK?
2. How is TD sibling adjustment in Taiwan and the UK influenced by demographic and psychological variables, including:
    a. Social support?
    b. Coping style?
    c. BAP levels?
3. Is there evidence of cultural influences on patterns of adjustment among TD siblings of children with autism?

2. Methods

2.1 Participants

Participants were mothers and TD sibling dyads of 80 and 75 families from Taiwan and the UK respectively. All the mothers were biological parents. Families were enrolled in the study if they (a) had a child with ASD and another TD sibling between 7 and 18 years old; (b) parents reported that the child with ASD had an established diagnosis (c) their TD siblings and parents were able to speak, read, and write English or Chinese (as appropriate) fluently. Participant descriptive data are provided in Table 1.

2.2 Procedure

The research followed the policy and procedures of the [REMOVED FOR PEER REVIEW] Ethics Committee and of the ethics committees of recruiting organizations. Families were recruited through organizations including schools and hospital clinics, and by advertising the study online direct to potential participants. Following initial

contact and eligibility checks, two bound packs of questionnaires (one for the parent and the other for the sibling) were sent out, each containing full instructions, and a stamped addressed envelope for their return. Importantly, sibling packs were separate from those of their parents and they were provided with an envelope to allow them to seal their completed questionnaire pack before it was returned by the parent.

2.3 Measurements

2.3.1 Demographic characteristics of the sample

A study-specific self-report questionnaire was used to request information about family members using multiple choice questions and open-ended response format. This sought information on family composition and ethnicity, child's diagnosis and education, parental education and employment. It was important to distinguish between families' actual income and individuals' perceptions of their financial status, i.e. whether they feel it is sufficient to support their family. Mothers were therefore also asked to evaluate their subjective wealth, using 6 categories ("Manage very well", "Manage quite well", "Get by alright", "Don't manage very well", "Have some financial difficulties" and "Are in deep financial trouble"). These results are presented in Table 1.

2.3.2 Predictors

ASD symptom profile

The Social Responsiveness Scale, 2nd Edition (SRS-2; Constantino, 2012) was used to provide further details of, and support the parent's declaration of a diagnosis for their child with ASD, in addition to measuring the severity of the autistic symptoms. The SRS-2 contains 65 items, with five subscales assessing Social Awareness, Social Cognition, Social Communication, Social Motivation, and Autistic Mannerisms. Parents use a 4-point Likert scale to respond to statements according to how well they describe their child. The Chinese SRS demonstrates excellent test–retest reliability (r = .95), with authors suggesting that it is a reliable and valid instrument for the Chinese population in Taiwan (Gau, Liu, Wu, Chiu, & Tsai, 2013). Internal consistency for the present sample was α =.94 for both UK and Taiwan samples.

TD siblings' life events

The impact of stressful life events upon the family was assessed by TD sibling report using the Child and Adolescent Survey of Experiences (CASE; Allen, Rapee, & Sandberg, 2012). Participants: a) report whether they have experienced specific life events in the past 12 months (e.g. "*I was teased or bullied*") and b) rate the emotional impact of the experience on a 6-point scale. The CASE measure has demonstrated satisfactory one-week test-retest reliability (r = .75) (Allen, et al., 2012). This measure was translated into Chinese for the present study by the first author, following the processes recommended by Flaherty et al. (1988) and Guillemin, Bombardier, and Beaton (1993). The Kuder-Richardson-20 for the present UK and Taiwanese data on number of life events experienced was .66 and .67 respectively. The Cronbach's alpha for the emotional impact of the experience was .93 in the UK and .96 in Taiwan.

Subjective well-being

Mothers and TD siblings also completed the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). Respondents rate several domains of their own lives (e.g. "*The conditions of my life are excellent*") on a 7-point scale with higher values corresponding to higher degree of life satisfaction. The two-week interval test-retest of this measure is r = .83 (Pavot & Diener, 1993). The Chinese version also shows adequate psychometric properties (Shek, 2002). The internal consistency in the present UK and Taiwanese sample was α = .99 and .81 respectively.

Social support

The Child and Adolescent Social Support Scale (CASSS; Malecki, Demaray, Elliott, and Nolten, 1999), is a 60-item multi-dimensional scale measuring children's perceived informal social support from five sources: parents, teachers, classmates, close friends and others in school. Questions include "*Listen to me when I need to talk*" and "*Help me solve problems by giving me information*." Children and adolescents respond by rating each item according to its frequency and importance. Only the frequency subscale was used in the present study. A Chinese version is available and has previously been used with a Taiwanese sample (Chen & Wei, 2013). The

frequency scale showed excellent internal consistency (α =. 97) in both UK and Taiwanese sample in the present study.

Coping

Parental coping style was measured by the Coping Orientations to the Problems Experienced Questionnaire (COPE) by Carver, Scheier, and Weintraub (1989). The COPE is divided into 15 sub-scales which can be used to create scores for three coping styles: problem-focused, passive avoidant emotion-focused coping, and emotional approach (Pakenham, Samios, & Sofronoff, 2005). The COPE has been widely used in family research when exploring family coping patterns such as in families with a child with ASD (Benson, 2010; Hastings et al., 2005; Ingersoll & Hambrick, 2011). The COPE has also been applied to Chinese populations (Lin, Orsmond, Coster, & Cohn, 2011; Mak, Ho, & Law, 2007; Wang, Michaels, & Day, 2011). The internal consistency in the present study was α = .88 for the UK and .91 for the Taiwanese sample.

The TD siblings' coping style was assessed using the self-report Kidcope measure (Spirito, Stark, Grace, & Stamoulis, 1991), the scores of which can be categorized into three coping styles: active, avoidant, and negative. The Kidcope has been used to assess coping strategies employed by children and youths in various settings, such as children with ASD (Lee et al., 2012) and their siblings (Ross & Cuskelly, 2006). The wording is suitable for the target population, with items such as "*I just tried to forget it*" and "*I wished the problem had never happened*". The test-retest reliability ranged from *r* =.13-.80. A Chinese version of the Kidcope (Cheng & Chan, 2003) is also available and has been used in Chinese populations. However, the psychometric properties have not been reported yet. For the present study, the internal consistency was α = .68 for the UK, and .61 for the Taiwanese sample.

Parent and sibling BAP levels

The Autism Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) was used to assess the presence of BAP levels in the mothers and TD siblings of children with ASD. The AQ-adult is a 50-item self-report inventory which has been validated in culturally diverse samples and demonstrates satisfactory

psychometric properties (Ruta, Mazzone, Mazzone, Wheelwright, & Baron-Cohen, 2012; Stewart & Austin, 2009; Wakabayashi et al., 2007). There is a Chinese version of the AQ (AQ-Chinese) (Lau et al., 2012; Liu, 2008). Internal consistency in the present sample was α =.89 and α =.97 in Taiwanese and the UK sample respectively.

The TD siblings' BAP level was reported by their mothers using the AQ-Child and AQ-Adolescent (Auyeung, Baron-Cohen, Wheelwright, & Allison, 2008; Baron-Cohen, Hoekstra, Knickmeyer, & Wheelwright, 2006) depending on the age of the TD sibling. The Chinese AQ-Adolescent/Child (Chan & Liu, 2008; Chan, Liu, Chung, Sheh, & Woo, 2008) has been used with Chinese populations, although its psychometric information is yet to be examined. For the current study, internal consistency was α =.91 and α =.97 in Taiwan and the UK respectively.

2.3.3 Outcome

The Strengths and Difficulties Questionnaire (SDQ, Goodman (1998) was used as a measure of psychological adjustment in children and adolescents. We collected parent-report SDQ scores from mothers, and TD sibling self-report SDQ as well. The SDQ contains five subscales covering emotional, conduct, hyperactivity/inattention, peer problems and prosocial behaviour. A higher score on the prosocial behaviour scale reflects positive behaviour, but for the remainder of the four subscales represents problem scores. By summing the problem scores, users can create a "Total Difficulties Score" ranging from 0 to 40, where higher scores indicate greater difficulties. The age range in the present research was wider than the original SDQ protocol, but the measure has been successfully applied with younger and wider age groups (Liu et al., 2013; Muris, Meesters, & Van den Berg, 2003). The self-rated SDQ has satisfactory discriminability between community and clinical samples (Goodman, 2001). A Chinese version of the SDQ (SDQ-C) [1] is available and has also demonstrated satisfactory psychometric properties, with moderate to good test-retest reliability (Liu et al., 2013). Furthermore, the SDQ-C has been found to have a slightly different factor structure than the original SDQ (Liu, et al., 2013). Scoring and subscales were based on the Chinese version only when making a comparison with normative data (Table 2). All other analyses were based on the original 25-item

[1] http://www.sdqinfo.org/py/sdqinfo/b3.py?language=Chinese

version of the SDQ to allow direct comparison between Taiwanese and UK data. In the present study the internal consistency in the parent-report SDQ for total difficulties scores was .88 in the UK and .60 in Taiwan, while in the TD sibling self-report it was .70 and .60 in the UK and Taiwan respectively.

2.4 Analysis Methods

The two groups were first characterised using t-tests or chi-square to explore group differences in background variables. We used the same tests to explore differences between SDQ data (parent-reported and sibling-reported) and country-specific norms.

To investigate predictors of TD siblings' adjustment, hierarchical regression was used with sibling-rated SDQ scores as outcomes. We first explored correlations between demographic/psychological variables and outcome variables (TD siblings' total difficulties and prosocial behaviour on the SDQ) within each cultural group. Once variables had been identified which significantly correlated with outcomes, these potential predictor variables were entered into the hierarchical regression equation. Collinearity statistics indicated no evidence of multicollinearity between these selected variables. All the variance inflation factors (VIF) were below 2.

To determine the order in which participant groups and variables were entered, the Double ABCX Model (Mccubbin & Sussman, 1983) was used as a guide. Employing a model in this way permits a strong theoretically-driven analysis which is less vulnerable to Type I errors (Cohen, Cohen, West, & Aiken, 2003; Mcintyre, Montgomery, Srinivasan, & Weitz, 1983). Considering the loading on parents and the suitability of measuring this concept in younger children, the "reframing the situation" factor from the Double ABCX model was not directly surveyed in the present study but integrated with other measure constructs. The importance of this cognitive appraisal of the stressor was still therefore acknowledged. In brief, the Double ABCX Model organises potential influences on adjustment into four categories of which three were of relevance to the present study: stressor and pile-up demands, family adaptive resources, and coping.

Recent research on the BAP emphasizes that epigenetic vulnerability may interact with environmental stress to influence TD sibling and parents' adjustment outcome and well-being (Ingersoll & Hambrick, 2011; Mohammadi & Zarafshan, 2014;

Orsmond & Seltzer, 2009; Petalas, et al., 2012). Thus, parent and sibling BAP-related levels were also taken into consideration. Influence of demographic variables was also considered, with the final assignment of study measures to each category as follows:

- Demographics: family demographics
- Stressor and pile-up demands: sibling negative life event impact, ASD severity, and parent and sibling BAP
- Family adaptive resources: parent and sibling satisfaction with life; social support received by siblings; positive life event impact for siblings
- Coping: parents' and TD siblings' coping style
- Sibling adjustment outcome: SDQ

3. Results

3.1 Describing the Sample

There were a number of differences in parental characteristics between samples (see Table 1). The UK mothers were approximately twice as likely to have a higher education degree as mothers in Taiwan, and significantly more UK mothers were in professional or "non-manual skilled" job positions. Furthermore, UK mothers were in part-time rather than full-time employment more often than the Taiwanese mothers. There were also differences in terms of subjective wealth in Taiwan and the UK, with more UK mothers reporting "Get by alright" in relation to their finances. TD siblings' characteristics between the two countries were broadly similar on a large number of demographic variables including age and gender (see Table 1).

Regarding the children with ASD, there was no significant between group difference in the proportion of children falling into each diagnostic sub-group or in SRS-2 scores. Nevertheless, children with ASD in Taiwan had significantly higher rates of parent-reported intellectual disability, while their UK counterparts had significantly higher rate of comorbid diagnoses (e.g. attention deficit hyperactivity disorder, obsessive compulsive disorder, and epilepsy). A higher percentage of the children with ASD in the UK sample were in mainstream school (52.7%), while the majority of Taiwanese sample had combination education placements (53.2%). These differences may reflect differences which exist in clinical/diagnostic practice and in the school system in

Taiwan and the UK (Wang, 2009) rather than absolute differences in sample characteristics.

3.2 Sibling Adjustment

The mean adjustment scores of parents and TD siblings are reported in Table 2 along with the results of t-tests comparing these data with country-specific norms.

Taiwanese siblings were fairly well adjusted according to their self-report. Their scores were significantly better than national norms on conduct problems and did not differ from norms on the other difficulty subscales, although they did report significantly lower scores (i.e. less well-adjusted) on the prosocial subscale (effect size = 1.02). Taiwanese parents reported their children to have significantly fewer difficulties in internalizing and conduct problems, but more difficulties in hyperactive and prosocial behaviours relative to normative data. The pattern of reports compared to Taiwanese norms suggests some similarity in parent and sibling views: for example both parents and siblings reported fewer sibling conduct problems and greater difficulties in prosocial behaviour compared to national norms.

Conversely, UK siblings rated themselves as experiencing difficulties in all negative domains except for conduct problems. These difficulties were greatest for peer problems (effect size = 1.69). Difficulties in emotional symptoms (effect size = 0.44) were also identified by the parent-report version. Parents in the UK also reported TD children's greater peer problems and lower prosocial behaviour relative to UK norms. UK siblings did not report significant difficulties in the prosocial domain. The pattern of parent and sibling reports compared to UK norms suggests some difference in views, with siblings reporting difficulties on a greater number of subscales than did parents.

Taking sibling self-report and parent report together, it appears that of all the aspects of adjustment, difficulties in siblings' prosocial behaviour compared to country norms was an area of concern in Taiwan, whilst the emotional symptoms and peer problems were more of concern to TD siblings and parents in the UK.

Previous research which explores the different factor structures of the SDQ-C was identified (Du, et al., 2008; Liu, et al., 2013). In the Chinese context, subscales such

as emotional and peer problems and total difficulties were suggested to be more multifactorial than those in the Western contexts. The present Taiwanese data also showed low internal consistency which was consistent with SDQ-C psychometric data, suggesting that certain items appear to have different functions or meanings in Western and Chinese cultures. Hence, caution is required in the interpretation of Taiwanese data in comparison with UK findings.

3.3 Influences on adjustment in Taiwan

Only variables showing significant correlations with outcome measures were considered in the regression analysis. Full details of correlation calculations are provided in Supplementary Table 1. BAP did not correlate with either total difficulties or prosocial behaviour in the Taiwan sample and so this variable was not included in either regression. Although VIFs were less than 2, the correlations between the number and impact of life events were high (> 0.8). Of these two variables, only impact of life events was included in the regression models, as this fits more closely with the concepts represented in the ABCX model.

The hierarchical regression model to predict sibling self-report SDQ total difficulties in the Taiwan sample is shown in Table 3. Together, these variables explained 47% of the variance in the model. The model changed significantly when the stressors and resources were entered, but the demographic and coping variables did not show a significant impact when entered into the model. Within the "stressors" category, the only significant predictor was the sibling self-reported measure of the impact of negative life events. Despite the rest of the variables not individually correlating with the outcome within the model, they had a significant collective impact on the outcome.

As for the regression on sibling self-report SDQ prosocial behaviour, around 36% of the variance in prosocial behaviour can be predicted by these variables. In this case, resources once again had a significant influence on outcome, with social support having an independent significant relation with prosocial behaviour. Stressors were not related to prosocial outcome, but sibling coping style was a significant predictor.

3.4 Influences on Adjustment in the UK

As above, only variables with significant correlations were considered for the regression analysis, and these correlations results are provided in Supplementary

Table 2. Again, impact rather than number of life events was included in the regression model, as these two variables were highly correlated.

In the UK sample, the regression model for sibling self-report SDQ total difficulties score is shown in Table 4. The model predicts 35% of the variance in siblings' adjustment difficulties. There were significant changes when entering the stressors, resources and coping variables into the model. In particular, self-reported life satisfaction negatively predicts total difficulties, and sibling negative coping is also associated with higher total difficulties scores.

For siblings' self-report prosocial behaviour, the regression predicted 19 % of the variance in TD siblings' prosocial behaviour. In this case, only resources have predictive value in the model, again with social support received individually associated with outcome.

3.5 Comparison of the UK and Taiwan

This study affords an opportunity to examine cultural similarities and differences in the predictors of interest, which are social support, coping and BAP. Social support seems to have a relatively consistent impact on outcome as a predictor of both total difficulties and prosocial behaviour in both samples. Coping has an impact on prosocial behaviour in the Taiwan sample, with active sibling coping having a positive predictive relation with prosocial outcomes. In the UK, coping does not relate to prosocial behaviour scores and instead is linked to total difficulties. Siblings reporting more negative coping behaviours also had higher total difficulties scores. Finally, levels of BAP traits were not correlated with outcome at all in the Taiwan sample, but in the UK they are associated with higher levels of total difficulties (see Supplementary Tables 1 and 2).

4. Discussion

4.1 Adjustment of siblings in the UK and Taiwan

The specific strength of the present study is that it uses not only parents' reports but also siblings' self-report to evaluate sibling adjustment. The TD siblings in the UK rated themselves as having elevated adjustment difficulties in various domains, whereas TD siblings in Taiwan only reported elevated difficulties in the prosocial

domain compared to culture-specific norms. The UK finding is consistent with Hastings and Petalas (2014), who also found elevated levels of behavioural and emotional problems in TD siblings compared to norms. Likewise studies have found that Chinese adolescents in general report fewer emotional and behavioural problems than those from Western populations (Du, Kou, & Coghill, 2008; Wang, Liu, & Wang, 2014; Yao et al., 2009). A complication with studies which compare Chinese and Western populations directly is that there is evidence that adults in collectivist countries (including China and Taiwan) are more likely to display socially desirable responding in order to present oneself in a culturally accepted and approved light than those from individualistic countries (Lalwani, Shavitt, and Johnson, 2006). In the present study, samples were compared directly to national norms, meaning that such cultural influences were accounted for.

The present Taiwanese data reported levels of conduct problems were lower than other behavioural domains shown and significantly lower than norm data, whether from parents or TD siblings' report. In Chinese society, children are disciplined to behave obediently and follow norms of socially acceptable behaviour (Chao, 1994). Parents have high expectations of the behaviour of their children (Ho, 1996; Phinney, Ong & Madden, 2000). Conduct problems, such as the expression of aggression, are not encouraged as they contravene the cultural virtue of respecting the elderly and parents (Ho, 1996), while following social norms is highly valued in the philosophy of Chinese-collectivism (Chen & Chen, 2004). This Chinese philosophy also encourages Chinese people to repress their emotions: expression of emotion should be carefully regulated as group harmony and hierarchies are usually considered the priority (Bond, 1993). Reported conduct problems in the present Taiwanese sample fit this picture. The fact that they were even lower than norm data may be because these parents have even higher expectations of the behaviour of their children, or because siblings were aware of the behavioural difficulties of the child with ASD, and did not wish to cause their parents further concern, something which previously been described, though by Western siblings of children with autism (Moyson & Roeyers, 2011). With limited research conducted in the Chinese culture, these findings from the SDQ highlight the importance of understanding parents and TD siblings' responses within their own culture.

It appears that of all the aspects of adjustment, difficulties in siblings' emotional problems and peer relationships compared to country norms were areas of concern for siblings and their parents in the UK. These finding are consistent with other Western based studies (Bågenholm & Gillberg, 1991; Hastings, 2003b). There are two possible explanations for this. Firstly, it is possible that the impact of a child with ASD makes it difficult for siblings to spend time with peers. As the research literature has reported, it requires a significant amount of time to take care of a sibling with a disability; thus, they may have had relatively less time to spend with their peers and opportunities to participate in leisure activities might also have been restricted (Barak-Levy, et al., 2010; Mchale & Gamble, 1989; Stoneman, 2005). Secondly, research has suggested that TD siblings displayed very mild to significant difficulties in emotional understanding compared to siblings of children without ASD even at an early age (Cassel et al., 2007; Meadan, et al., 2010; Yirmiya et al., 2006), and this too may have influenced outcome.

Disagreements among different groups of informants are commonly found in behaviour evaluation, perhaps due to differing mind-sets and reference situations (Achenbach et al., 2008). Such discrepancies have been found among informants from a variety of cultural backgrounds (De Los Reyes & Kazdin, 2005). For the present research, such informant differences were important, as they suggested a gap between parents' and children's perceptions in viewing the TD siblings' adjustment, although this was more evident the UK sample, with siblings reporting themselves as less well-adjusted than did parents. Both parent and sibling reports have their own value in understanding TD siblings' adjustment. There is perhaps no "true" picture of outcome: siblings might be more aware of their own adjustment, but alternatively might be susceptible to response bias. Equally, parents may be unaware of sibling difficulties, or on the other hand they may have a more measured approach to what constitutes "difficulties," based on their longer experience, (e.g. Hastings & Petalas, 2014; Macks & Reeve, 2007). The important point is perhaps that it is crucial to listen to concerns about sibling adjustment, whether these are raised by parents or siblings.

4.2 Predictors of Adjustment

Using TD sibling self-report as an outcome measure, separate models explaining a high proportion of TD siblings' adjustment outcome in Taiwan and in the UK were

found. The overlapping, but distinct predictive models provide evidence of cultural similarities and differences in how variables influence sibling adjustment. Sibling life experiences, either positive or negative, did individually or in conjunction with other "stressors or resources" show an impact on TD siblings' adjustment in both countries. In particular, it was the impact of negative life experiences which had significantly influenced TD siblings' adjustment difficulties in Taiwan. This is consistent with literature, suggesting that individuals' own perception and explanation of experiences plays a crucial role in outcome (Allen, et al., 2012).

In both the Taiwan and the UK, some of the social support and coping variables contributed to the prediction of TD siblings' adjustment either individually or as part of a collection of "resources". Findings were consistent with previous Western research, in which social support was associated with a better adjustment outcome for siblings of children with ASD (Kaminsky & Dewey, 2002; Lovell & Wetherell, 2016).

The link from sibling coping to adjustment is important because it suggests that teaching TD siblings' positive coping styles is an accessible and practical way to intervene to improve outcomes and this is also consistent with other research (e.g. Mchale & Gamble, 1989; Smith, Elder, Storch, & Rowe, 2015). Although siblings' own coping styles contributed to the coping resources predicting outcome in both countries, different types of coping styles were found to contribute to TD siblings' adjustment outcome in Taiwan and the UK. Parents' coping formed part of the coping resources associated with outcome in the UK but not in Taiwan. It had previously been unclear whether Chinese parent and TD siblings' coping would relate to sibling adjustment in the same way as other Western based research. The findings of the present research do indicate some differences, supporting the importance of discussing coping within a cultural context (Hsu, Chen, Wang, & Sun, 2008) and underscoring the importance of considering culture in any interventions to support the development of coping.

Furthermore, the influence of the BAP level in conjunction with other variables was also found to predict TD siblings' adjustment difficulties in the UK, but not Taiwan. The reasons for this are unclear, but it may relate to the fact that sibling self-reported adjustment difficulties in the UK included emotional and peer problems, subscales

which may have been particularly influenced by difficulties within the BAP domain. The present UK data reveal a need to consider the influence of BAP level when providing support to families of children with ASD, in line with previous findings (Bailey, et al., 1998; Bolton, et al., 1994; Mohammadi & Zarafshan, 2014; Sucksmith, Roth, & Hoekstra, 2011). Health professional and educators should be aware of how these traits might influence TD siblings when forming approaches to support siblings.

It is perhaps the case that different predictive factors would have emerged, had parent- rather than sibling-reported SDQ been employed as the outcome measure. Previous Western research using parent-report SDQ has found similar predictors, such as TD siblings' BAP level (e.g. Mohammadi & Zarafshan, 2014; Petalas, Hastings, Nash, Lloyd, & Dowey, 2009). However, the use of the sibling-report SDQ in the present study acknowledged the importance of the siblings' own perceptions of their wellbeing, and avoided the risk of uni-rater response bias.

It is important to note that siblings in both countries did show high levels of satisfaction with their life, despite some challenges, although the continuing development of appropriate support remains vital. Factors that were identified in the present study as contributing to TD siblings' adjustment outcome are potentially important for health and educational professionals working with families of children with ASD in the two cultural contexts.

5. Limitations

Despite careful considerations when choosing suitable measurements and approaches to recruit participants, the present research inevitably encountered some limitations. The participants in this research were all volunteers which might contribute to a certain degree of bias, with parents who were either particularly concerned or less stressed about their TD children's adjustment perhaps being more likely to agree to take part in the study. Parents might have had more positive attitudes to disability than some others who did not choose to participate in the research. This possible volunteer bias is difficult to examine or overcome, given the sensitive nature of family research, but the relatively large sample recruited goes some way to addressing the issue (Hodapp, et al., 2005).

Using a cross-cultural design, there is an inevitable need to consider the application of the measurement instruments in different cultural settings. Since the majority of the measurements, such as coping and adjustment scale, are established upon values within Western cultures, translated items might have slightly different meanings in the context of non-Western cultures. For example, it cannot be established with certainty whether the differences in SDQ data compared with cultural norms found in Taiwan and the UK reflect cultural differences in sibling adjustment in the two countries or whether they are a reflection of the Western-developed SDQ measure not being a sufficiently sensitive indicator of emotional and behavioural difficulties in non-Western populations (as indicated by the lower internal consistency in the Taiwanese data). Although efforts were made to use well-validated translated measures, such as the Chinese SDQ with its different factor structure, it is nonetheless possible that some findings, such as the lack of relations between parents' and TD siblings' coping in Taiwanese families, reported in the supplementary data, might result from such measurement issues. Whilst the use of similar measures across cultures is important in cross-cultural comparison, incorporating additional scales representing Eastern values in future research would help to provide a fuller coverage of key variables across cultural groups (Tsai, 2016).

In the present research sample, more than half of the mothers had a higher education degree and were relatively satisfied with their finance, which may decrease the generality of the findings. These families might be more aware of the social support that could benefit their family and have greater access to resources to promote their TD children's adjustment. Lower social economic status (SES) has been found to have a potentially strong influence on how families with a child with ASD raise their children compared to other demographic factors (Giallo & Gavidia Payne, 2006; Macks & Reeve, 2007). It is possible that with families representing a broader range of SES, TD siblings' adjustment outcome might be different.

The research provides a valuable insight into the self-reported difficulties of siblings, and their own appraisal of their life satisfaction and coping style. However, among parents, the data collected were all provided by mothers. Previous research has found that there are some differences between mothers and fathers of children with ASD in terms of coping (Hastings, et al., 2005; Kaniel & Siman-Tov, 2011; Pisula &

Kossakowska, 2010) and in viewing their TD children's adjustment (Griffith, Hastings, & Petalas, 2013). It is not known whether the same differences would be apparent in Chinese mothers and fathers. Thus future cross-cultural research should seek to include the participation of fathers.

6. Conclusion

This study is relatively unique in exploring TD siblings' adjustment by using both parent and child self-report, in both Chinese and Western cultures, and thus makes a meaningful contribution to the literature on families of individuals with ASD. This study has demonstrated the impact of having a brother or sister with ASD for the TD siblings, and how this is influenced by cultural context. It is clear from the present study that understanding such cultural differences in perceptions of adjustment and coping is vital if we are to support siblings effectively. Future research which further explores between- and within-group variability in adjustment and relationship experiences in theoretically grounded studies contextualised within such a cultural perspective are essential in moving forwards in intervention design (McHale et al., 2016). In identifying the impact of social support, coping and BAP on sibling adjustment, and how this can vary across culture, this research has provided an outlook for future research.

Acknowledgements

The research reported in this paper was supported through PhD studentship funding from the University of Edinburgh and a Taiwanese Government Research Scholarship. We would like to thank the parents and siblings who participated in this study. Their kindness in sharing their experiences enabled the completion of this research.

Reference

Achenbach, T.M., Becker, A., Döpfner, M., Heiervang, E., Roessner, V., Steinhausen, H.C., & Rothenberger, A. (2008). Multicultural assessment of child and adolescent psychopathology with ASEBA and SDQ instruments: Research findings, applications, and future directions. *Journal of Child Psychology and Psychiatry*, *49*(3), 251-275.

Allen, J.L., Rapee, R.M., & Sandberg, S. (2012). Assessment of maternally reported life events in children and adolescents: A comparison of interview and

checklist methods. *Journal of Psychopathology and Behavioral Assessment, 34*(2), 204-215.

Auyeung, B., Baron-Cohen, S., Wheelwright, S., & Allison, C. (2008). The autism spectrum quotient: Children's version (AQ-Child). *Journal of Autism and Developmental Disorders, 38*(7), 1230-1240.

Bågenholm, A., & Gillberg, C. (1991). Psychosocial effects on siblings of children with autism and mental retardation: A population-based study. *Journal of Intellectual Disability Research, 35*(4), 291-307.

Bailey, A., Palferman, S., Heavey, L., & Le Couteur, A. (1998). Autism: The phenotype in relatives. *Journal of Autism and Developmental Disorders, 28*(5), 369-392.

Barak-Levy, Y., Goldstein, E., & Weinstock, M. (2010). Adjustment characteristics of healthy siblings of children with autism. *Journal of Family Studies, 16*(2), 155-164.

Baron-Cohen, S., Hoekstra, R.A., Knickmeyer, R., & Wheelwright, S. (2006). The autism-spectrum quotient (AQ) - adolescent version. *Journal of Autism and Developmental Disorders, 36*(3), 343-350.

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The autism-spectrum quotient (AQ): Evidence from asperger syndrome/high-functioning autism, malesand females, scientists and mathematicians. *Journal of Autism and Developmental Disorders, 31*(1), 5-17.

Bauminger, N., & Yirmiya, N. (2001). The functioning and well-being of siblings of children with autism: Behavioral-genetic and familial contributions. In Jacob A. Burack, Tony Charman, Nurit Yirmiya & Philip R. Zelazo (Eds.), *The development of autism: Perspectives from theory and research* (pp. 61-80). London: Lawrence Erlbaum.

Benson, P.R. (2006). The impact of child symptom severity on depressed mood among parents of children with ASD: The mediating role of stress proliferation. *Journal of Autism and Developmental Disorders, 36*(5), 685-695.

Benson, P.R. (2010). Coping, distress, and well-being in mothers of children with autism. *Research in Autism Spectrum Disorders, 4*(2), 217-228.

Berry, J.W., Poortinga, Y.H., Breugelmans, S.M., Chasiotis, A., & Sam, D.L. (2011). *Cross-cultural psychology research and applications* (Third ed.). Cambridge ; New York: Cambridge University Press.

Blacher, J., & McIntyre, L. (2006). Syndrome specificity and behavioural disorders in young adults with intellectual disability: Cultural differences in family impact. *Journal of Intellectual Disability Research, 50*(3), 184-198.

Bolton, P., Macdonald, H., Pickles, A., Rios, P., Goode, S., Crowson, M., . . . Rutter, M. (1994). A case-control family history study of autism. *Journal of Child Psychology and Psychiatry, 35*(5), 877-900.

Bond, M.H. (1993). Emotions and their expression in Chinese culture. *Journal of Nonverbal Behavior, 17*(4), 245-262.

Carver, C.S., Scheier, M.F., & Weintraub, J.K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology, 56*(2), 267-283.

Cassel, T.D., Messinger, D.S., Ibanez, L.V., Haltigan, J.D., Acosta, S.I., & Buchman, A.C. (2007). Early social and emotional communication in the infant siblings of children with autism spectrum disorders: An examination of the broad phenotype. *Journal of Autism and Developmental Disorders, 37*(1), 122-132.

Chan, R., & Liu, W.S. (2008). Autism spectrum quotient (AQ) (Adolescent), from http://www.autismresearchcentre.com/arc_tests

Chan, R., Liu, W.S., Chung, K.K., Sheh, C.S., & Woo, E.K.F. (2008). Autism spectrum quotient (AQ) (Child), from http://www.autismresearchcentre.com/arc_tests

Chao, R. (1994). Beyond parental control and authoritarian parenting style: Understanding Chinese parenting through the cultural notion of training. *Child Development, 65*(4), 1111-1119.

Chen, J.K., & Wei, H.S. (2013). School violence, social support and psychological health among Taiwanese junior high school students. *Child Abuse & Neglect, 37*(4), 252-262.

Chen, X.P., & Chen, C.C. (2004). On the intricacies of the Chinese guanxi: A process model of guanxi development. *Asia Pacific Journal of Management, 21*(3), 305-324.

Cheng, S.T., & Chan, A.C. (2003). Factorial structure of the Kidcope in Hong Kong adolescents. *The Journal of genetic psychology, 164*(3), 261-266.

Cho, S.J., Singer, G.H., & Brenner, M. (2000). Adaptation and accommodation to young children with disabilities: A comparison of Korean and Korean American parents. *Topics in Early Childhood Special Education, 20*(4), 236-249.

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (Third ed.). Mahwah, N.J. ; London: L. Erlbaum.

Constantino, J.N. (2012). *Social responsiveness scale™, second edition (SRS™-2).* Los Angeles, CA: Western Psychological Services.

Constantino, J.N., Lajonchere, C., Lutz, M., Gray, T., Abbacchi, A., McKenna, K., . . . Todd, R.D. (2006). Autistic social impairment in the siblings of children with pervasive developmental disorders. *American Journal of Psychiatry, 163*(2), 294-296.

Conway, S., & Meyer, D. (2008). Developing support for siblings of young people with disabilities. *Support for Learning, 23*(3), 113-117.

De Los Reyes, A., & Kazdin, A.E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin, 131*(4), 483-509.

Diener, E., Emmons, R.A., Larsen, R.J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71-75.

Du, Y., Kou, J., & Coghill, D. (2008). The validity, reliability and normative scores of the parent, teacher and self report versions of the strengths and difficulties questionnaire in China. *Child and Adolescent Psychiatry and Mental Health, 2*(1), 1-15.

Dunn, J. (1983). Sibling relationships in early childhood. *Child Development, 54*(4), 787-811.

Flaherty, J.A., Gaviria, F.M., Pathak, D., Mitchell, T., Wintrob, R., Richman, J.A., & Birz, S. (1988). Developing instruments for cross-cultural psychiatric research. *The Journal of Nervous and Mental disease, 176*(5), 260-263.

Gadow, K.D., DeVincent, C.J., Pomeroy, J., & Azizian, A. (2004). Psychiatric symptoms in preschool children with PDD and clinic and comparison samples. *Journal of Autism and Developmental Disorders, 34*(4), 379-393.

Gau, S.S.F., Chou, M.C., Lee, J.C., Wong, C.C., Chou, W.J., Chen, M.F., . . . Wu, Y.Y. (2010). Behavioral problems and parenting style among Taiwanese children with autism and their siblings. *Psychiatry and Clinical Neurosciences, 64*(1), 70-78.

Gau, S.S.F., Liu, L.T., Wu, Y.Y., Chiu, Y.N., & Tsai, W.C. (2013). Psychometric properties of the Chinese version of the social responsiveness scale. *Research in Autism Spectrum Disorders, 7*(2), 349-360.

Giallo, R., & Gavidia Payne, S. (2006). Child, parent and family factors as predictors of adjustment for siblings of children with a disability. *Journal of Intellectual Disability Research, 50*(12), 937-948.

Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(11), 1337-1345.

Goodman, R., Meltzer, H., & Bailey, V. (1998). The strengths and difficulties questionnaire: A pilot study on the validity of the self-report version. *European Child & Adolescent Psychiatry, 7*(3), 125-130.

Griffith, G.M., Hastings, R.P., & Petalas, M.A. (2013). Brief Report: Fathers' and mothers' ratings of behavioral and emotional problems in siblings of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 44*(5), 1230-1235.

Guillemin, F., Bombardier, C., & Beaton, D. (1993). Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. *Journal of Clinical Epidemiology, 46*(12), 1417-1432.

Hastings, R.P. (2003a). Behavioral adjustment of siblings of children with autism engaged in applied behavior analysis early intervention programs: The moderating role of social support. *Journal of Autism and Developmental Disorders, 33*(2), 141-150.

Hastings, R.P. (2003b). Brief report: Behavioral adjustment of siblings of children with autism. *Journal of Autism and Developmental Disorders, 33*(1), 99-104.

Hastings, R.P., Kovshoff, H., Brown, T., Ward, N.J., Degli Espinosa, F., & Remington, B. (2005). Coping strategies in mothers and fathers of preschool and school-age children with autism. *Autism, 9*(4), 377-391.

Hastings, R.P., & Petalas, M.A. (2014). Self-reported behaviour problems and sibling relationship quality by siblings of children with autism spectrum disorder. *Child: Care, Health and Development, 40*(6), 833-839.

Hesse, T.L., Danko, C.M., & Budd, K.S. (2013). Siblings of children with autism: Predictors of adjustment. *Research in Autism Spectrum Disorders, 7*(11), 1323-1331.

Ho, D.Y. (1996). Filial piety and its psychological consequences. In Michael Harris Bond (Ed.), *The handbook of Chinese psychology* (pp. 155-165): Hong Kong: Oxford University Press.

Hodapp, R.M., Glidden, L.M., & Kaiser, A.P. (2005). Siblings of persons with disabilities: Toward a research agenda. *Mental Retardation, 43*(5), 334-338.

Holroyd, E.E. (2003). Chinese cultural influences on parental caregiving obligations towards children with disabilities. *Qualitative Health Research, 13(1), 4-19.*

Hsu, W.Y., Chen, M.C., Wang, T.H., & Sun, S.H. (2008). Coping strategies in Chinese social context. *Asian Journal of Social Psychology, 11*(2), 150-162.

Ingersoll, B., & Hambrick, D.Z. (2011). The relationship between the broader autism phenotype, child severity, and stress and depression in parents of children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 5*(1), 337-344.

Kaminsky, L., & Dewey, D. (2002). Psychosocial adjustment in siblings of children with autism. *Journal of Child Psychology and Psychiatry, 43*(2), 225-232.

Kaniel, S., & Siman-Tov, A. (2011). Comparison between mothers and fathers in coping with autistic children: A multivariate model. *European Journal of Special Needs Education, 26*(4), 479-493.

Lalwani, A.K., Shavitt, S., & Johnson, T. (2006). What is the relation between cultural orientation and socially desirable responding? *Journal of Personality and Social Psychology, 90*(1), 165-178.

Lamb, M.E. (2014). Sibling relationships across the lifespan: An overview and introduction. In Michael E Lamb & Brian Sutton-Smith (Eds.), *Sibling relationships: Their nature and significance across the lifespan*. East Sussex: Taylor and Francis.

Lau, W.Y.P., Gau, S.S.F., Chiu, Y.N., Wu, Y.Y., Chou, W.J., Liu, S.K., & Chou, M.C. (2012). Psychometric properties of the Chinese version of the autism spectrum quotient (AQ). *Research in Developmental Disabilities, 34*(1), 294-305.

Lee, G.K., Thomeer, M.L., Lopata, C., Schiavo, A.L., Smerbeck, A.M., Volker, M.A., . . . Mirwis, J.E. (2012). Coping strategies and perceived coping effectiveness for social stressors among children with HFASDs: A brief report. *Children Australia, 37*(3), 108-114.

Lin, L.Y., Orsmond, G.I., Coster, W.J., & Cohn, E.S. (2011). Families of adolescents and adults with autism spectrum disorders in Taiwan: The role of social support and coping in family adaptation and maternal well-being. *Research in Autism Spectrum Disorders, 5*(1), 144-156.

Liu, M.J. (2008). Screening adults for asperger syndrome and high-functioning autism by using the autism-spectrum Quotient (AQ) (Mandarin Version). *Bulletin of Special Education, 33*(1), 73-92.

Liu, S.K., Chien, Y.L., Shang, C.Y., Lin, C.H., Liu, Y.C., & Gau, S.S.F. (2013). Psychometric properties of the Chinese version of strength and difficulties questionnaire. *Comprehensive Psychiatry, 54*(6), 720-730.

Lovell, B., & Wetherell, M.A. (2016). The psychophysiological impact of childhood autism spectrum disorder on siblings. *Research in Developmental Disabilities, 49-50*, 226-234.

Macks, R.J., & Reeve, R.E. (2007). The adjustment of non-disabled siblings of children with autism. *Journal of Autism and Developmental Disorders, 37*(6), 1060-1067.

Mak, W.W.S., Ho, A.H.Y., & Law, R.W. (2007). Sense of coherence, parenting attitudes and stress among mothers of children with autism in Hong Kong. *Journal of Applied Research in Intellectual Disabilities, 20*(2), 157-167.

Mak, W.W.S., & Ho, G.S.M. (2007). Caregiving perceptions of Chinese mothers of children with intellectual disability in Hong Kong. *Journal of Applied Research in Intellectual Disabilities, 20*(2), 145-156.

Malecki, C.K., Demaray, M.K., Elliott, S.N., & Nolten, P.W. (1999). *The Child and Adolescent Social Support Scale*. DeKalb, IL: Northern Illinois University.

Mascha, Katerina, & Boucher, Jill. (2006). Preliminary investigation of a qualitative method of examining siblings' experiences of living with a child with ASD. *The British Journal of Development Disabilities, 52*(102), 19-28.

McConkey, R., Truesdale-Kennedy, M., Chang, M.Y., Jarrah, S., & Shukri, R. (2008). The impact on mothers of bringing up a child with intellectual disabilities: A cross-cultural study. *International Journal of Nursing Studies, 45*(1), 65-74.

McCubbin, H.I., & Sussman, M.B. (1983). *Social stress and the family: Advances and developments in family stress theory and research*. New York: Haworth Press.

McHale, S.M., & Gamble, W.C. (1989). Sibling relationships and adjustment of children with disabled brothers and sisters. *Developmental Psychology,25(3), 421-429.*

McHale, S.M., Updegraff, K.A., & Feinberg, M.E. (2016). Siblings of youth with autism spectrum disorders: Theoretical perspectives on sibling relationships and individual adjustment. *Journal of Autism and Developmental Disorders, 46*(2), 589-602.

McIntyre, S.H., Montgomery, D.B., Srinivasan, V., & Weitz, B.A. (1983). Evaluating the statistical significance of models developed by stepwise regression. *Journal of Marketing Research, 20*(1), 1-11.

McStay, R.L., Trembath, D., & Dissanayake, C. (2014). Stress and family quality of life in parents of children with autism spectrum disorder: Parent gender and the double ABCX Model. *Journal of Autism and Developmental Disorders, 44*(12), 3101-3118.

Meadan, H., Stoner, J.B., & Angell, M.E. (2010). Review of literature related to the social, emotional, and behavioral adjustment of siblings of individuals with autism spectrum disorder. *Journal of Developmental and Physical Disabilities, 22*(1), 83-100.

Mohammadi, M.R., & Zarafshan, H. (2014). Family function, parenting style and broader autism phenotype as predicting factors of psychological adjustment in typically developing siblings of children with autism spectrum disorders. *Iranian Journal of Psychiatry, 9*(2), 55-63.

Moyson, T., & Roeyers, H. (2011). The Quality of Life of Siblings of Children with Autism Spectrum Disorder. *Exceptional Children, 78*(1), 41-55.

Muris, P., Meesters, C., & Van den Berg, F. (2003). The strengths and difficulties questionnaire (SDQ): Further evidence for its reliability and validity in a community sample of Dutch children and adolescents. *European Child & Adolescent Psychiatry, 12*(1), 1-8.

Myers, B.J., Mackintosh, V.H., & Goin-Kochel, R.P. (2009). "My greatest joy and my greatest heart ache:" Parents' own words on how having a child in the autism spectrum has affected their lives and their families' lives. *Research in Autism Spectrum Disorders, 3*(3), 670-684.

Orsmond, G.I., Kuo, H.Y., & Seltzer, M.M. (2009). Siblings of individuals with an autism spectrum disorder: Sibling relationships and wellbeing in adolescence and adulthood. *Autism, 13*(1), 59-80.

Orsmond, G.I., & Seltzer, M.M. (2009). Adolescent siblings of individuals with an autism spectrum disorder: Testing a diathesis-stress model of sibling well-being. *Journal of Autism and Developmental Disorders, 39*(7), 1053-1065.

Pakenham, K.I., Samios, C., & Sofronoff, K. (2005). Adjustment in mothers of children with asperger syndrome: An application of the double ABCX model of family adjustment. *Autism, 9*(2), 191-212.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological Assessment, 5*(2), 164-172.

Petalas, M.A., Hastings, R.P., Nash, S., Hall, L.M., Joannidi, H., & Dowey, A. (2012). Psychological adjustment and sibling relationships in siblings of children with autism spectrum disorders: Environmental stressors and the broad autism phenotype. *Research in Autism Spectrum Disorders, 6*(1), 546-555.

Petalas, M.A., Hastings, R.P., Nash, S., Lloyd, T., & Dowey, A. (2009). Emotional and behavioural adjustment in siblings of children with intellectual disability with and without autism. *Autism, 13*(5), 471-483.

Phinney, J., Ong, A., & Madden, T. (2000). Cultural values and intergenerational value discrepancies in immigrant and non-immigrant families. *Child Development, 71*(2), 528-539.

Pisula, E., & Kossakowska, Z. (2010). Sense of coherence and coping with stress among mothers and fathers of children with autism. *Journal of Autism and Developmental Disorders, 40*(12), 1485-1494.

Piven, J., Palmer, P., Jacobi, D., Childress, D., & Arndt, S. (1997). Broader autism phenotype: Evidence from a family history study of multiple-incidence autism families. *American Journal of Psychiatry, 154*(2), 185-190.

Power, T.G. (2004). Stress and coping in childhood: The parents' role. *Parenting: Science and Practice, 4*(4), 271-317.

Pozo, P., Sarriá, E., & Brioso, A. (2014). Family quality of life and psychological well-being in parents of children with autism spectrum disorders: A double ABCX model. *Journal of Intellectual Disability Research, 58*(5), 442-458.

Ravindran, N., & Myers, B.J. (2011). Cultural influences on perceptions of health, illness, and disability: A review and focus on autism. *Journal of Child and Family Studies, 21*(2), 311-319.

Rivers, J.W., & Stoneman, Z. (2003). Sibling relationships when a child has autism: Marital stress and support coping. *Journal of Autism and Developmental Disorders, 33*(4), 383-394.

Rodrigue, J.R., Geffken, G.R., & Morgan, S.B. (1993). Perceived competence and behavioral adjustment of siblings of children with autism. *Journal of Autism and Developmental Disorders, 23*(4), 665-674.

Roeyers, H., & Mycke, K. (1995). Siblings of a child with autism, with mental retardation and with a normal development. *Child: Care, Health and Development, 21*(5), 305-319.

Ross, P., & Cuskelly, M. (2006). Adjustment, sibling problems and coping strategies of brothers and sisters of children with autistic spectrum disorder. *Journal of Intellectual and Developmental Disability, 31*(2), 77-86.

Ruta, L., Mazzone, D., Mazzone, L., Wheelwright, S., & Baron-Cohen, S. (2012). The Autism-Spectrum Quotient-Italian version: A cross-cultural confirmation

of the broader autism phenotype. *Journal of Autism and Developmental Disorders, 42*(4), 625-633.

Shek, D. (2002). Family functioning and psychological well-being, school adjustment, and problem behavior in Chinese adolescents with and without economic disadvantage. *The Journal of Genetic Psychology, 163*(4), 497-502.

Shin, J.Y., & Crittenden, K.S. (2003). Well-being of mothers of children with mental retardation: An evaluation of the double ABCX model in a cross-cultural context. *Asian Journal of Social Psychology, 6*(3), 171-184.

Skinner, E., & Zimmer-Gembeck, M. (2007). The development of coping. *Annual Review of Psychology, 58*, 119-44.

Smith, L., Elder, J., Storch, E., & Rowe, M. (2015). Predictors of sense of coherence in typically developing adolescent siblings of individuals with autism spectrum disorder. *Journal of Intellectual Disability Research, 59*(1), 26-38.

Spirito, A., Stark, L.J., Grace, N., & Stamoulis, D. (1991). Common problems and coping strategies reported in childhood and early adolescence. *Journal of Youth and Adolescence, 20*(5), 531-544.

Stewart, M.E., & Austin, E.J. (2009). The structure of the autism-spectrum quotient (AQ): Evidence from a student sample in Scotland. *Personality and Individual Differences, 47*(3), 224-228.

Stoneman, Z. (2005). Siblings of children with disabilities: Research themes. *Journal Information, 43*(5), 339-350.

Sucksmith, E., Roth, I., & Hoekstra, R. (2011). Autistic traits below the clinical threshold: Re-examining the broader autism phenotype in the 21st century. *Neuropsychology Review, 21*(4), 360-389.

Tsai, H.W. (2016). *The psychosocial adjustment of siblings of children with autism spectrum disorder in Taiwan and the UK: Influence of BAP characteristics, coping styles, social support and demographic factors*. (Doctoral theisis). The University of Edinburgh.

Tsao, L.L., Davenport, R., & Schmiege, C. (2012). Supporting siblings of children with autism spectrum disorders. *Early Childhood Education Journal, 40*(1), 47-54.

Wakabayashi, A., Baron-Cohen, S., Uchiyama, T., Yoshida, Y., Kuroda, M., & Wheelwright, S. (2007). Empathizing and systemizing in adults with and without autism spectrum conditions: Cross-cultural stability. *Journal of Autism and Developmental Disorders, 37*(10), 1823-1832.

Wang, H.M. (2009). *Social and educational inclusion in Taiwan in relation to elementary schooling with reference to the UK, particularly Scotland* (Doctoral thesis). Retrieved from http://theses.gla.ac.uk/

Wang, J.N., Liu, L., & Wang, L. (2014). Prevalence and associated factors of emotional and behavioural problems in Chinese school adolescents: A cross-sectional survey. *Child: Care, Health and Development, 40*(3), 319-326.

Wang, P., Michaels, C.A., & Day, M.S. (2011). Stresses and coping strategies of Chinese families with children with autism and other developmental disabilities. *Journal of Autism and Developmental Disorders, 41*(6), 783-795.

Yao, S., Zhang, C., Zhu, X., Jing, X., McWhinnie, C.M., & Abela, J.R. (2009). Measuring adolescent psychopathology: Psychometric properties of the self-report strengths and difficulties questionnaire in a sample of Chinese adolescents. *Journal of Adolescent Health, 45*(1), 55-62.

Yirmiya, N., Gamliel, I., Pilowsky, T., Feldman, R., Baron-Cohen, S., & Sigman, M. (2006). The development of siblings of children with autism at 4 and 14 months: Social engagement, communication, and cognition. *Journal of Child Psychology and Psychiatry, 47*(5), 511-523.

Yoder, P., Stone, W.L., Walden, T., & Malesa, E. (2009). Predicting social impairment and ASD diagnosis in younger siblings of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 39*(10), 1381-1391.